Establishing an Enterprise Earned Value Management Capability

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USA
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Establishing an Enterprise EVM Capability

- What is EVM
- Who is USA
- Background
  - Past Experience
- Implementation Approach
  - Processes
  - People and Infrastructure
  - Tools
- Other ‘Words of Wisdom’
- Going Forward

Earned Value Management (EVM) - What It Is

- **EVM is a management system that**
  - **integrates the committed cost and schedule for a program's work content into a tightly controlled baseline;**
  - **and quantitatively measures progress towards those commitments**
- **EVM is a technique for program/project managers to**
  - **objectively measure contract performance,**
  - **have early identification of variances from the baseline,**
  - **mitigate risks associated with cost and schedule overruns,**
  - **and methodically forecast final cost and schedule outcomes**
- **EVM is the best known, proven way to integrate:**
  - **Content / Schedules / Resources / Risk Management**

Successful EVM is critically dependent on a sound plan

EVM – How it Works

- **EVM quantitatively measures work accomplished as the basis for variance analysis**
  - **Variance is determined by actual work performed vs. actual cost incurred; not planned vs. actual costs for a given elapsed period**

- **EVM regularly probes key measurement questions**
  - **How much work should have been completed?**
  - **How much work was completed?**
  - **How much did the completed & in-process work cost?**
  - **What is the project risk/opportunity from late or early completion?**
  - **What is the project risk/opportunity from higher or lower cost for completed work?**
  - **How much is the total project supposed to cost?**
  - **What do we estimate the project actually will cost?**

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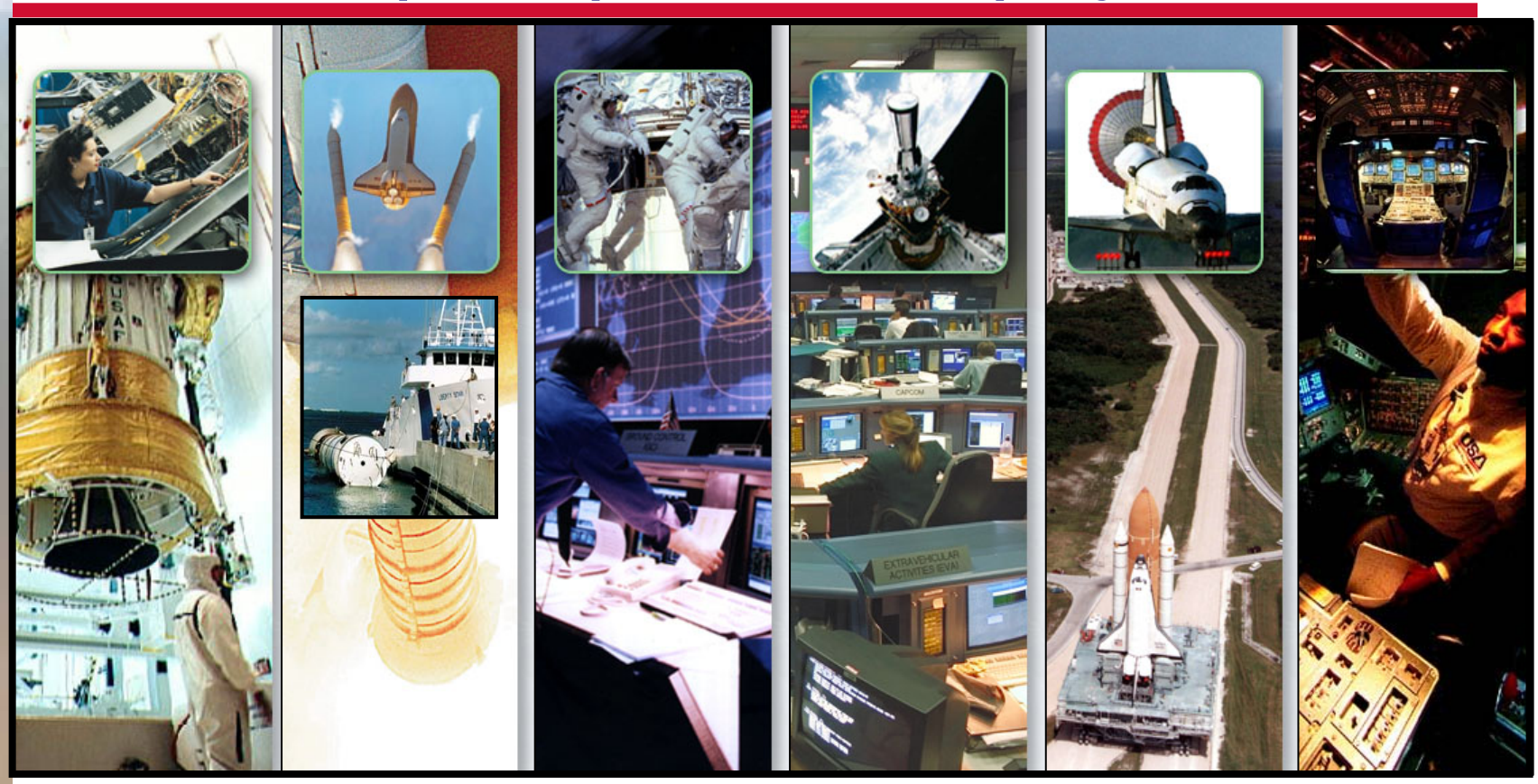
The Space Operations Company



Premier provider of space operations services

- NASA's Prime Contractor for end-to-end Space Shuttle Operations
- 24/7 Operations Support to International Space Station
- Bringing space operations skills to the Constellation Program

EVM at USA – Past Experience

- **Pockets of "mini-EVM" throughout the company**
  - **Adherence to basic concept; but performed manually on small scale projects**

- **An EVM System was implemented in 2001-2002 for use on major Space Shuttle Upgrades development projects**
  - **Selected program product tool**
    - **Did so very rapidly; and had to create substantial custom code**
  - **Baselined 'System Description Document', established internal processes, and trained personnel**
    - **In parallel with initial EVM execution and Integrated Baseline Review**
  - **Plus had major subcontractors with EV reporting requirements**
    - **Established roll-up interface while learning EVM ourselves**

EVMS at USA – Compelling Need

- **With the 2004 announcement of the 'Vision for Space Exploration", NASA entered a major acquisition phase for the first time in decades**
  - **Drawing from DoD best practices, EVM is now imposed on virtually all NASA major acquisitions**

- **USA began an aggressive internal change analysis designed to ensure the long-term viability of the company**
  - **A new environment with new customer relationships, new contractual arrangements, and new requirements from both**
  - **Among the highest priority of many identified major enterprise wide projects was the need for an Enterprise EVM System**

Implementation Approach – 3 Key Components

People + Process + Tool = System

- **Each component requires unique attention for success**
- **Process and People take the longest to solidify and cultivate**
- **Understanding and documenting the process helps ensure appropriate Tool selection**
- **Building all three at the same time should be avoided**
  - **Can be draining and counterproductive for the team**

Facing the Biggest Barrier to Success

- **Internal politics and "culture" are by far the biggest barriers to adopting change, including new systems**
  - **There is a strong resistance to change in most organizations**
  - **Resistance, many times, stems from the fear of the unknown**
  - **It is human nature: people tend to blame tools and processes when it is really their own lack of knowledge and understanding**

- **What worked best in addressing this:**
  - **Senior Management commitment – visible and strong**
  - **Communications – lots of it**
  - **Training – early and often**
  - **Core Team with "Help Desk" mentality**

EVMS Implementation – A Full Blown Project

- Project authorized in Feb 2006, to complete in Feb 2007
  - Project completed (final vendor software installed) in June 2007
  - Project came in 9% under cost

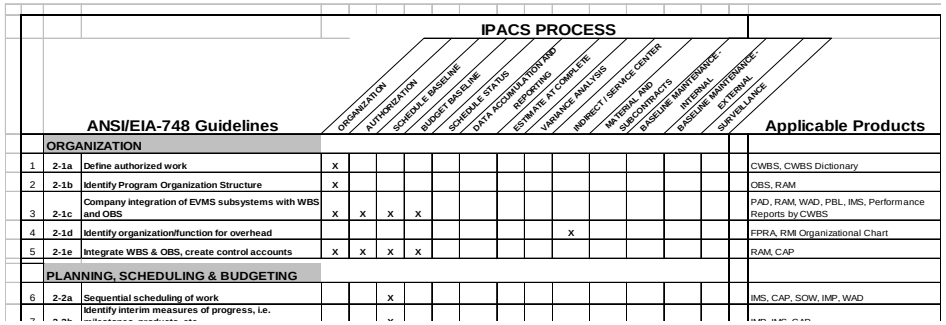
- Applied sound integrated project management
  - System requirements definition first
  - High fidelity estimate of cost and schedule
  - Integrated baseline for implementation
  - Assignment of appropriately skilled resources
  - Clear requirements and selection criteria for tool solution
  - Allowance for design cycles
  - EVM
  - Risk Management

Enablers to Implementation Success

- Top management was committed to implementation of an Enterprise EVMS
  - Commitment was regularly communicated
- Adequate funding was provided
- Skilled leadership and expertise resources were assigned
- Imminent contractual requirements provided a strong “forcing function”
- Development of a structured training program was given high priority
  - Train early and often!

Process Definition – Requirements First

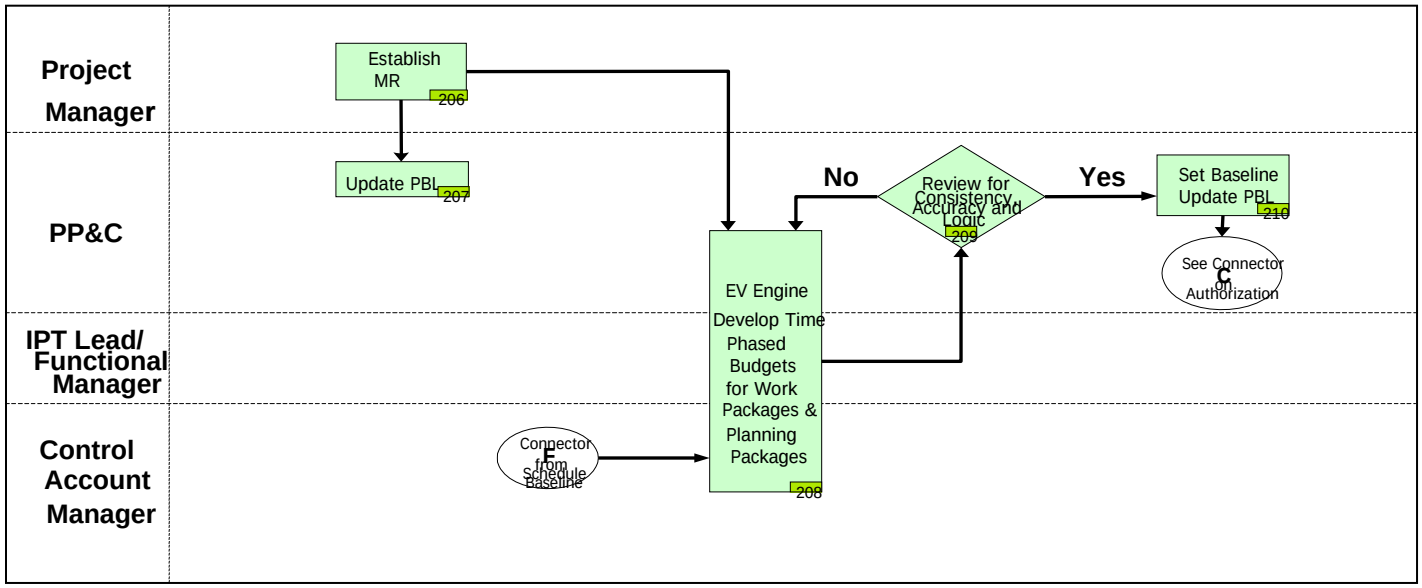
- **Develop the Process prior to tool selection**
  - **Provides context to the tool evaluation and selection**
  - **Trying to implement tool while defining the process is not cost effective and will delay implementation**
- **Define Process based on ANSI-748 guidelines**
- **Create Compliance document to map processes to each of the ANSI-748 Guidelines**
  - **Assures the system will be compliant for DCMA validation**
  - **Map to the ANSI-748 very early in process development**
    - **Reduces the risk of significant rework later on**



		ANSI/EIA-748 Guidelines	IPACS PROCESS: ORGANIZATION	AUTHORIZATION	SCHEDULE BASELINE	BUDGET BASELINE	SCHEDULE STATUS	DATA ACCUMULATION AND REPORTING	ESTIMATE AT COMPLETE	VARIANCE ANALYSIS	INDIRECT / SERVICE CENTER	MATERIAL AND SUBCONTRACTS	BASELINE MAINTENANCE - INTERNAL	BASELINE MAINTENANCE - EXTERNAL	SURVEILLANCE	Applicable Products
		ORGANIZATION														
1	2-1a	Define authorized work	x													CWBS, CWBS Dictionary
2	2-1b	Identify Program Organization Structure	x													OBS, RAM
3	2-1c	Company integration of EVMS subsystems with WBS and OBS	x	x	x	x										PAD, RAM, WAD, PBL, IMS, Performance Reports by CWBS
4	2-1d	Identify organization/function for overhead								x						FPRA, RMI Organizational Chart
5	2-1e	Integrate WBS & OBS, create control accounts	x	x	x	x										RAM, CAP
		PLANNING, SCHEDULING & BUDGETING														
6	2-2a	Sequential scheduling of work			x											IMS, CAP, SOW, IMP, WAD
7	2-2b	Identify interim measures of progress, i.e.			x											

Up Front Definition of the Process

- Create a System Description Document which defines the process in detail
- Use flows to define the process based on roles and responsibilities (Pgm Mgr, IPT Lead, Cntl Acct Mgr, etc)



- Evaluate processes regularly and modify based on lessons learned along the way

Establish the Infrastructure

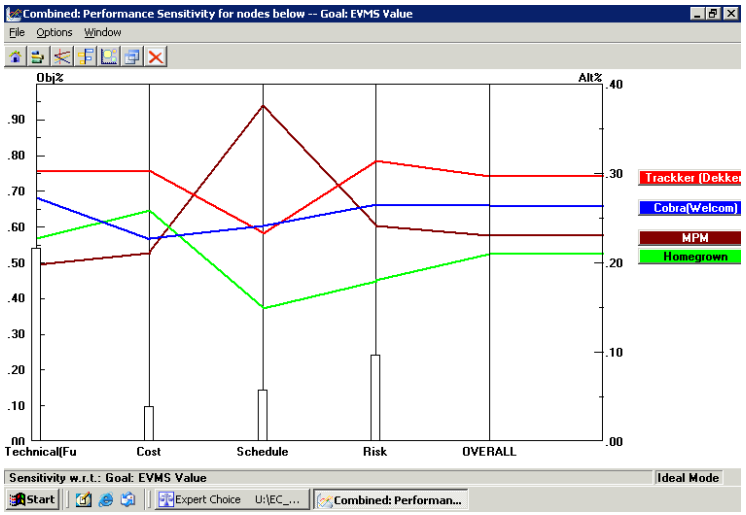
- **Executive Management ownership**
  - **EVMS co-owned by the Program/Project Management Process Owner and the Chief Financial Officer**
  - **Joint approval authority on the System Description Document**
- **Establish highly skilled Core Team**
  - **Small number of people, that are experts in EVM and company rates/accounting structures**
  - **To provide leadership, guidance, assistance – and lots of it!**
  - **Need the right personality/temperament**
- **Create a common Project Planning and Control (PP&C) organization with skilled schedulers and cost analysts**
  - **The real "nuts and bolts" people – key to helping the technical folks understand the process and the data**
  - **Responsible for the Process and System Description Document**
  - **Provide guidance and knowledge to Project Start-ups**

Tool Selection – Do Your Homework

- Take the time to develop requirements from the top down and engage stakeholders along the way
  - Allows the implementation team to focus on implementation without having to revisit the requirements along the way
- Include all the requirements for a validated EVM system
  - System Requirements, System Description, Processes & Tools
- Use a requirements hierarchy
  - High Level Objectives
    - First level of communication to stakeholders for buy-in
  - System Level Requirements
  - Detailed Requirements
    - Include justification and rationale in document
    - Directly drives evaluation criteria for tool selection

Tool Evaluation – Be As Sure As Possible

- **Define crisp, specific success criteria for evaluation of tool solution**



- **Utilize prototypes/demonstrations in tool selection, particularly in high risk areas**
  - **Don't just believe Suppliers when they say they can do something….make them show you**
  - **Ensure the tool can interface with and accommodate company capabilities and requirements**
    - **Example: demonstration of tool compatibility with internal rate/accounting structure**

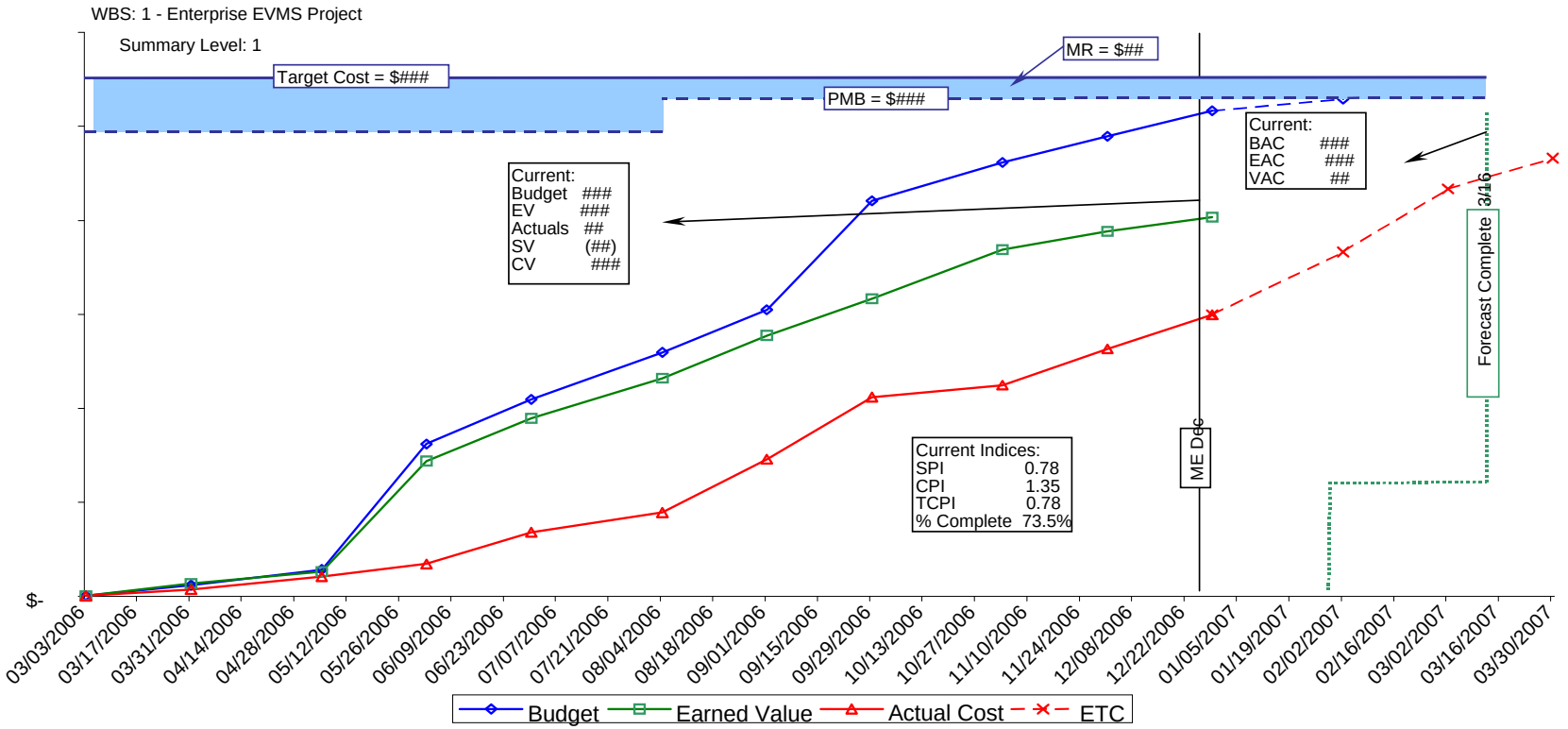
Implementation – Plan Carefully

- **Develop a Project Implementation Plan**
  - **Resource requirements for all participating organizations**
  - **Integrated Master Schedule**
  - **EV performance types and metrics**

- **Plan for and generate all Supporting Documentation – complete before "go live" date**
  - **Operating and desk procedures**
  - **Design documents (System Configuration, Interface Control Documents, etc)**
  - **Training Materials**

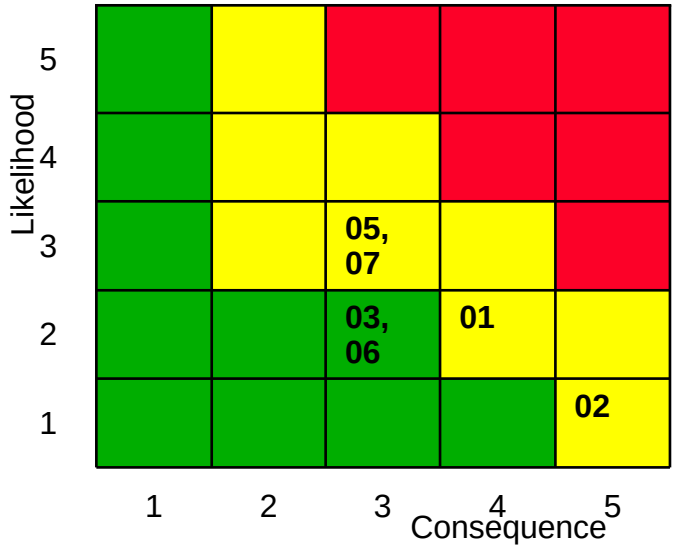
Implementation – Manage Carefully

- **Perform EVM on the Enterprise EVM Implementation**
  - **Start with the previous system (even if manual)**
  - **Move to new system at earliest opportunity – excellent component of the systems' verification**



Implementation – Manage Carefully

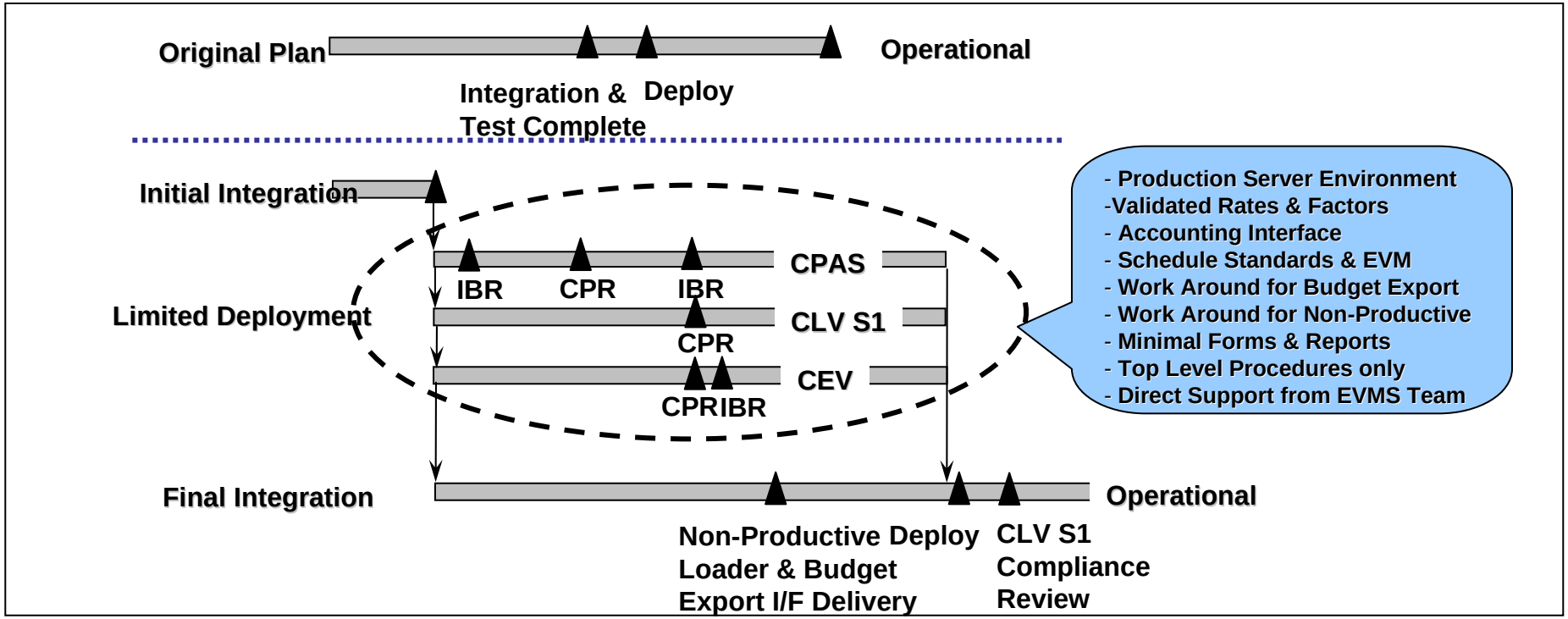
- **Perform Continuous Risk Management**
  - **Embed Risk Management from the start of the project**
  - **Create EVMS implementation-unique risk scorecard**
  - **Hold regular project risk reviews**



Risk ID	Risk Title
05	PeopleSoft Upgrade Schedule
07	Training Programs & Curriculum
01	Labor Resource Availability
02	System Certifiability

Implementation – Anticipate and Mitigate

- **Even with all this preparation, expect "bumps in the road"**
  - **Don't expect a "one pass" development effort**
  - **As hard as you try to cover everything, a project in the real world will encounter something (likely many somethings) that the preparations and procedures didn't address**



Preparing the People – Skill Set

Training, training, and more training

- It is difficult to fully understand and grasp EV concepts unless actively using on a project
  - Some of the training is "Use or Lose" and may require multiple training sessions over time
- Develop a structured, hierarchical training program
  - Create different levels of materials for progressive building of knowledge
    - EV 101 (general overview)
    - EV 102 (continues from EV 101 with focus specific to CAM duties such as trend analysis and performance report generation)
  - Train based on specific roles and responsibilities (PMs, CAMS, IPT Leads)
- Tailor materials to company specific processes and products
  - Off-the-shelf courses do not map to internal terminology and procedures
- Also include training on Project Management principles and techniques (EV, scheduling, planning, metrics, risks, etc)

Preparing to Prepare the People - Iteration

- **Be prepared to iterate on the training materials, levels, and tailoring**
  - **Conduct initial classes; plan for potentially significant modifications to materials**
  - **Conduct classes again; anticipate potential for additional iterations**
- **Be careful not to underestimate the cost of training program development**
  - **The training is critical to successful implementation on projects**
- **Be prepared to iterate on the timing of training delivery**
  - **Timing vs practical application is difficult**
  - **“Re-training” and “just in time” training is necessary**

Preparing the People - Mindset

Communicate, communicate, communicate

- **The culture change takes a long time!!!**
  - **Even with loads of training and attention, people gravitate back to "the way we've always done it"**
- **Constant and consistent supportive communications from the top down is required**
- **Ensure that the Manager of each Project has "the EVM mantra"**
- **Provide an "In-House Consulting" service – for the long haul**
  - **Experienced personnel to help project teams start up projects (planning, scheduling, tool usage, etc.)**
  - **The need for in-house expertise and "hands-on" mentoring of project teams cannot be over emphasized**
  - **It simply is not possible to bring a project team totally up to speed on all aspects of an EVMS through training alone**
  - **The need for this in-house expertise will continue longer than you think (we still don't know how long)**

‘Words of Wisdom’ – Other Hard Knocks

Some of our specific most difficult challenges have been

- **Playing “catch up” after contract award**
  - Lots of work and the project’s EV plan structure may have permanent major flaws
  - Really need to have much of this in place during proposal phase
- **Misunderstanding of Management Reserve (MR)**
  - What it is for; how you get it; how you use it
  - Particular threat in contracts with change thresholds
  - Additional oversight of MR is highly advised
- **Difficulty in grasping forward estimate concepts**
  - Estimate At Complete (EAC), best case, worst case, most likely

Going Forward - EVMS Validation

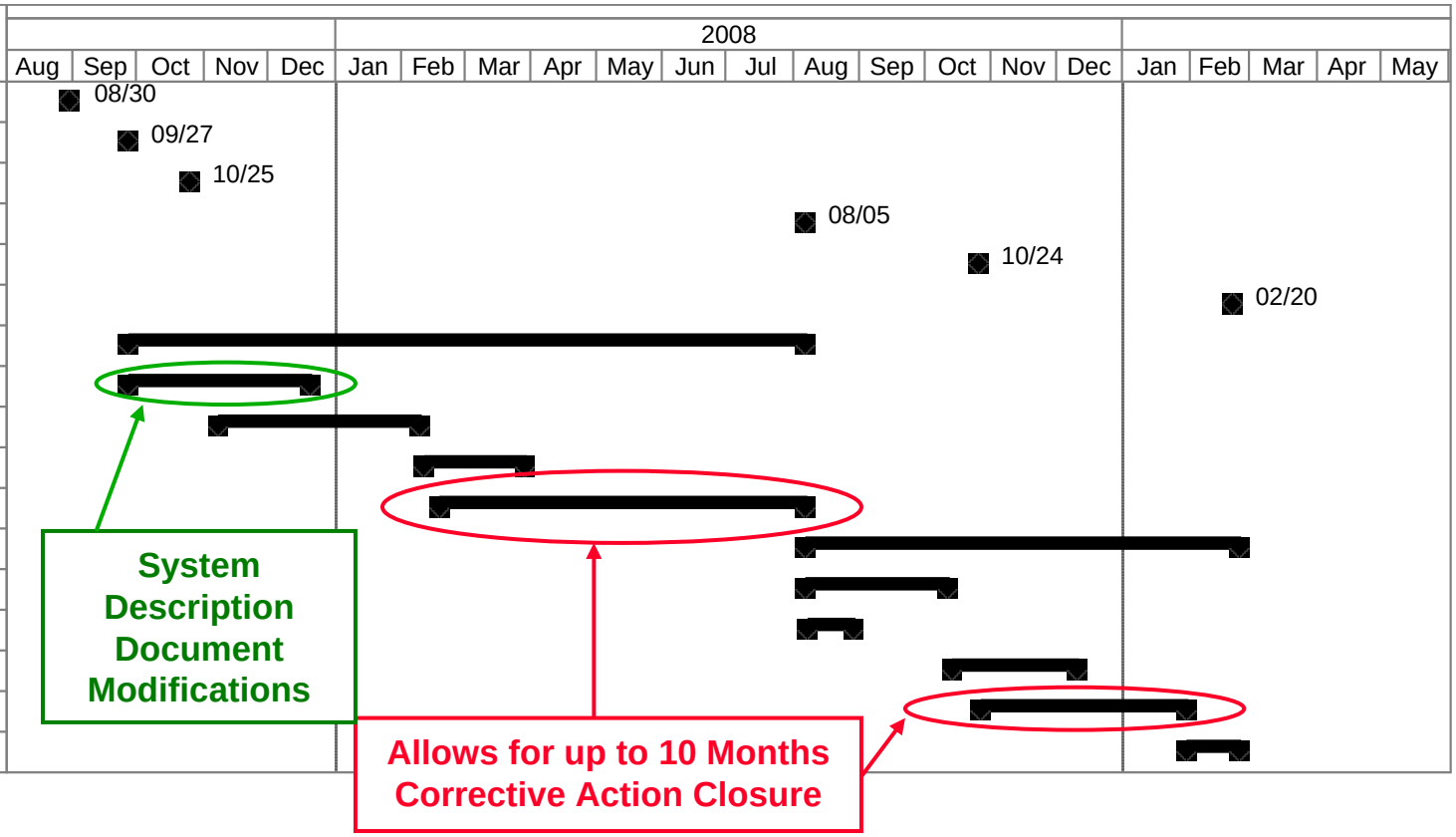
- Validation of the company's Enterprise EVMS
  - Driven by contractual requirements
  - DCMA-led with NASA and prime contractor involvement

- DCMA "24 Step" process for EVMS Validation
  - Lengthy (up to 18 months) but designed to maximize probability of success
  - Process consists of:
    - Progress Assistance Visit (PAV)
      - "Pre-review"
      - Corrective action period
    - Validation Review (VR)
    - Joint Surveillance

EVMS Validation

Appling the DCMA Validation Review Template……Example

ID	Name
1	Mock Review Outbrief
2	Orion IBR Complete
3	Initial Visit/Kickoff
4	PAV Complete
5	VR Complete
6	DCMA VR Letter Received
7	Progress Assistance Visit
8	PAV Review Data Submi
18	DCMA/NASA PAV Prep C
25	PAV Review Completed
29	PAV Corrective Actions (
34	Validation Review
35	DCMA/NASA VR Prep Cc
41	VR Review Data Submitt
46	VR Review Completed
50	VR Corrective Actions C
55	VR Process Completed



Reduced Corrective Action Time Can Shorten this Template

EVMS Validation – Current Status

- DCMA Initial Visit – October 2007
- DCMA Progress Assistance Visit – March 2008
  - Evaluation of USA Enterprise and Orion Contract
  - USA characterized as “way ahead of the game”
  - Very low number of discrepancies received
- DCMA Validation Review – October 2008
  - Streamlined approach enabled by prior successful reviews
  - Excellent results
    - Only 2 non-compliances
    - USA characterized as “at the top” for this stage
- Targeting final Validation review for April 2009

Summary – Best of 'What Went Right'

- Process in place first; clearly mapped to ANSI-748
- Solid requirements and evaluation approach for tool selection
- Structured EV training tailored to company process, structure, culture, terminology
- Strong management commitment and communication
- Core Team for "In-House Consulting"
- Central PP&C group for detailed assistance
- Anticipation and planning to address issues
- Continual evaluation and mitigation
- Patience and sense of humor

Thanks for your attention

Questions or comments?